garden of Mr. Linsley W. Ross, 12223 Eighth Avenue, Seattle NW, when a total of 19 were taken in moist to rainy weather conditions. Many more were crawling among garden plants. There were two color phases:

1. Back and mantle reddish-brown. Foot-fringe a brilliant terra-cotta, crossed by alternate thin black lines and wider black stripes. Occasional dark blotches on the mantle occurred on some specimens of this lighter colored phase. Sole light colored.

2. Back and mantle dark chocolate brown. Mantle with occasional small, variable-sized, black blotches but not prominent enough to take away from the generally dark, unicolored aspect. Foot-fringe not differently colored from the back, with the same type of black striping described for the lighter phase. Striping of the foot-fringe extends around and under the sole for 2 or 3 mm. on some specimens. Sole slate colored.

These colors fade out almost entirely after specimens have been preserved in alcohol for a day or so. Mr. Ross stated he first recognized this large slug as a garden pest in Seattle about 1940 because of its depredations on bearded iris and succulents.

Pilsbry (1948, p. 670) includes an occurrence of Arion ater in Portland, Oregon, in 1946 (B. G. Thompson, July 9, 1946).

Methods & Techniques

Notes on Cleaning Mollusks

BY

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After reviewing recently the excellent suggestions contained in the Second Edition of the AMU's "How to Collect Shells", it occurred to me to record several cleaning methods that have been used successfully at the California Academy of Sciences that may be helpful to some shell collectors.

1. There is on the market a supersonic device with the trade name "Sonblaster". While rather expensive (it costs around $120.- for the unit), it is the only equipment used so far that will clean many kinds of shells. The container is filled with water, which is agitated by a power unit transmitting high-frequency sound waves. The power is adjustable. Hands or fingers are not affected except for a slight tingling sensation. For larger shells we merely dip the shell to be cleaned into the agitated water several times with the result that all loose dirt and detritus is literally shaken off, falling to the bottom of the container in a cloud. Tiny shells we place in a small water-filled glass tube and dip this in and out several times. The method is especially fast and efficient for cleaning shells with a heavy periostracum which one wishes to preserve intact; it is excellent for cleaning the girdles of chitons, especially Mopalias and others with hairy or spiculose decoration; and it does a beautiful job on the sutures of small land species like Vertigo and Gastrocopta as well as "cleaning their teeth" if they have any within the apertures. For more solid, heavy shells, full power is needed, but for more delicate specimens reduced power is recommended to prevent shattering. (Incidentally, this equipment cleans eyeglasses and all sorts of small parts and gadgets, being an excellent remover of grease as well as of dirt.)

2. Leslie Hubricht's method (p. 77) of preserving slugs by anesthetizing and killing in water with five to ten percent chloretone in solution also works well with some marine species before final preservation. This is even better than the old method of "killing by drowning" in fresh water, which has been used on specimens of Onchidella with fully expanded specimens as a result. This same method also works well on Velutina and Lamellaria when the shell is to be preserved with the fully expanded animal.

3. A strong household bleach is a useful cleaning agent, if used judiciously. I have found that cleaning freshwater mollusks, such as Goniobasis, Fluminicola, Amnicola, and Hydrobia with a bleach used at full strength for one or two minutes only will remove all adhering algal or other extraneous detritus, leaving clean, bright, shining shells that are a credit to any collection. Leaving in strong bleach too long, however, will remove the periostracum, an undesirable result unless there is good reason for removing it purposely to expose the outer shell layer. Preliminary trial to determine just how long to leave specimens in the bleach solution is recommended. Unfortunately, this method will not work on old, long-dried-out freshwater specimens; it is effective only on shells fairly recently collected. Killing in alcohol prior to cleaning with bleach seems not to inhibit this cleaning process.

Information Desk

What's the Difference?

Holotype - Paratype - Syntype - Hypotype

BY

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In the 200 years that have passed since the first species of plants and animals were described by Linnaeus, a great many designations for type material have been invented. Some of these refer to what may be classed as "primary" types while others are concerned with "secondary" types.

Primary type material would include all the specimens which were used by the original author in preparing his original description. Secondary type material, on the other hand, would encompass those specimens which were used by other authors—and, of course, possibly even by the original author at a subsequent date—to either amplify or emend the original description, or to replace the original type specimen(s) if lost or destroyed. To the first group should be counted the holotype, the paratype(s), the syntype(s), and, under certain circumstances, the hypotype(s), while the second includes the neotype(s), the lectotype(s), and others.

The holotype is defined as the single specimen taken as "THE TYPE" by the original author of a species or subspecies. The paratype is a specimen or one of several specimens which were used by the original author as the basis of a new species or subspecies, in addition to the holotype. A syntype is one of several specimens of equal rank used in the original description without, however, being singled out as "holotype"; the word "cotype" is, fundamentally, a synonym of syntype; it is no longer used. A hypotype, finally, is a described, listed or figured specimen whether or not it is included in the discussion of the new taxon.

Early authors were rather lax in their attitude toward type specimens. It was not an uncommon practice to replace the original type specimen with a better "type" specimen, when it became available. Also, it was a fairly frequent practice for a museum to exchange type material, retaining one or two specimens of a given species. Today, when we are aware of the many difficulties attendant upon inadequate documentation, there is no excuse for less than the utmost care in selecting and preserving type specimens. This is true even where a species may have been found to be invalid for one of several possible reasons. However, the discovery of the so-called sibling species has added further strength to the need for care. Sibling-species are morphologically identical with each other, or at least so nearly so that even fairly careful examination does not reveal the fact that they are different species; yet sibling-species are reproductively isolated in spite of the great similarity of the adult individuals. Often, too, sibling-species may occur in the same locality and it is not impossible that they might even occupy the same habitat. From this it becomes evident that the conscientious taxonomist must base his description of a new taxon upon a single specimen—the holotype. This specimen thus becomes actually the name-bearer. No matter what discoveries may be made at a later time, the holotype remains the ultimate authority regarding that particular species and its name. It is not impossible that even with great care exercised in the examination of the type population, a sibling species might be inadvertently drawn in and included in the description. Later students will have the task of separating out the specimens which belong to the one, the original species, and the specimens properly assigned to the sibling-species. If the original author did not select a "holotype", there would be uncertainty as to which is the original species and which is the sibling-species, which latter must, of course, be given a different name.

There seems to be a growing trend to include as part of the description of a new species as full an appraisal as possible of the variability in the original population. This is actually most desirable, although not always possible. All specimens from this particular population become paratypes, except for the one select specimen, the holotype. The paratypes, as pointed out above, may, however, include specimens of a different species. But this possibility is more or less implied by the very fact that these specimens are designated as paratypes. Sometimes it is possible for an author to include in his appraisal of the variability of the new species material other than the original group collected at the type locality. Many au-